of Mn-containing perovskite represented by $A_{1-x}B_xMnO_3$ causes a transition temperature, where A is at least one of La, Pr, Nd and Sm rare earth ions, and B is at least one of Ca, Sr, and Ba alkaline rare earth ions.

## REMARKS

By this amendment, claims 11-19, 28 and 30 have been canceled without prejudice so as to reduce the issues remaining in this case. Claim 26 has been amended to incorporate the limitation of claim 30 and to define elements A and B in the same manner as claim 1. As such, no new issues have been presented. The application now includes claims 1, 4-6, 26, 27, and 29.

Claims 1, 4, 11-13, 16, 17 and 26-30 were rejected as being obvious over U.S. Patent 3,565,671 to Teeg and U.S. Patent 5,562,154 to Benson. Claims 5, 6, 14, 15, 18 and 19 were rejected as being obvious over Teeg and Benson further in view of U.S. Patent 5,608,414 to Amore. These rejections are traversed.

Each independent claim (claims 1 and 26) remaining in the case requires that the thermal control device include an Mn-containing perovskite substance represented by $A_{1-x}B_xMnO_3$ where A is at least one of La, Pr, Nd and Sm and where B is at least one of Ca, Sr, and Ba.

None of the references of record disclose or suggest a similar material used in a thermal control application. Specifically, Teeg suggests the use of vanadium oxide ($VO_2$) as a variable transmissivity overcoating to a reflective coating. In Teeg, as the temperature increases, the vanadium oxide overcoating becomes more transmissive to radiant energy, thus causing most of the incident radiation to be reflected back into space, while at lower temperatures, the vanadium oxide overcoating is less transmissive and less incident radiation is reflected (see column 4, lines 50-64). In Benson, vanadium oxide, titanium oxide, nickel sulfide, and vanadium oxy fluoride are identified as variable emissivity materials (see column 13, lines 57-65). Benson is directed to an insulative panel where the insulative properties can be controlled by the

operations of adding a metal hydride, or by varying electrical or thermal exposure of a variable emissivity coating in the vacuum insulation. Benson does not describe a passive thermal control device that automatically adjusts the temperature of an object, such as a spacecraft, to a desired temperature. Amore only teaches that in space applications, a semiconductor material, such as silicon or germanium, can be used as a layer which reflects visible light and allows infrared energy to pass.

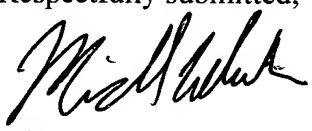
As such, none of the references contemplate, suggest or make obvious an Mn-containing perovskite substance represented by $A_{1-x}B_xMnO_3$ where A is at least one of La, Pr, Nd and Sm and where B is at least one of Ca, Sr, and Ba that is affixed to an object and serves the function of passive thermal control of the object.

As the Examiner can see from the record, it is unpredictable whether or not a material has high or low emissivity at high or low temperatures and requires testing to ascertain its function. For example, as can be seen from differences in the Benson, Neuman and Okamoto references with respect to the properties of vanadium oxide, different results may be reported for the same substance. Because none of the references of record show or suggest an Mn-containing perovskite substance may be used for thermal control of an object to which it is affixed, the remaining claims cannot be obvious over any combination of references of record. Moreover, while Benson contemplates doping of vanadium oxide, it does not suggest or contemplate doping with elements "A" or "B" set forth in the independent claims, and still would not results in an Mn-containing perovskite material even if "A"and "B" were included. Furthermore, no references of record suggest that an Mn-containing perovskite substance may be substituted for a vanadium oxide containing substance (and they would not since the Mn-containing perovskite containing substance required in this invention has different performance characteristics).

At the Examiner's Interview dated October 17, 2001, the Examiner requested copies of references cited in an article authored by Dr. Okamoto. These references are not in the possession of the undersigned, but attempts will be made to provide the Examiner with these copies.

In view of the above, the claims of record should be in *prima facie* condition for allowance. Reconsideration and allowance of claims 1, 4-6, 26, 27, and 29 at an early date is requested.

Respectfully submitted,



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